DOCUMENT RESUME

ED 387 029 HE 028 610

AUTHOR Haygood, E. Langston; Iran-Nejad, Asghar
TITLE A Study of the Relationship between Learning Conceptions and Learning Styles among College Students.
PUB DATE 11 Nov 94
NOTE 27p.; Paper presented at the Annual Meeting of the Mid-South Educational Research Association (Nashville, TN, November 9-11, 1994).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Academic Achievement; *Cognitive Style; *College Students; Comparative Analysis; Grade Point Average; Higher Education; *Personality Measures; Personality Traits; *Student Characteristics
IDENTIFIERS Learning Conceptions Inventory; *Learning Patterns; Myers Briggs Type Indicator

ABSTRACT

This study compared learning conceptions as described by the Learning Conceptions Inventory (LCI) with learning styles and personality types of the Myers-Briggs Inventory and with grade point averages among 303 college and graduate students from several institutions in Alabama. Data were analyzed using canonical correlational analysis and regression analysis. Results indicated that teaching and learning that is "whole-theme" correlates with the

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ED 387 029

A STUDY OF THE RELATIONSHIP BETWEEN LEARNING CONCEPTIONS AND LEARNING STYLES AMONG COLLEGE STUDENTS

E. Langston Haygood
Asghar Iran-Nejad
The University of Alabama

Running Head: **LEARNING**

Paper presented at the 1994 Annual Meeting
Mid-South Educational Research Association
Nashville, TN
November 9-11, 1994

TM 022 610

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A STUDY OF THE RELATIONSHIP BETWEEN LEARNING CONCEPTIONS AND LEARNING STYLES AMONG COLLEGE STUDENTS

INTRODUCTION

Smith, Halpin & Halpin (1993) described a longitudinal study of incoming freshmen at Mississippi State University (MSU). The study revealed that over 70% of the freshmen with less than a 2.0 grade point average at the end of their first semester do not complete their bachelor's degree--even when they stay in school a little longer. MSU is not alone. National studies have revealed that 40% of entering freshmen never finish their baccalaureate degree (Smith, et al, 1993).

Several questions emerge in the wake of Smith's, et al (1993) study. For example, What did the 70% expect? What was their view of college, of themselves? What conceptions of learning did they have? What were their learning styles? Would teacher- or self-awareness of their learning conceptions and/or learning styles have made a difference? What changes did the 30% make who finally graduated?

The recent interest in research on learning conceptions (Gow & Kember, 1993; Bigge, 1993; Entwistle, 1988; Bereiter, 1990) as well as the popularity of learning style research (Schmeck, 1988; Ehrman & Oxford, 1990) may be helpful in addressing some of the questions above, and perhaps make a difference in the academic lives of college students in the future.

Conceptions of Learning

A learning conception is a general framework in which a student approaches learning. It is a preconception, a way of parsing one's own world (cf. Bereiter, 1990). Saljo (1979) identified five conceptions of learning, and Beaty, Dall'Alba & Marton (1990) added another.

Recently, Bereiter (1990) proposed two learning conceptions in terms of contextual modules that students use in their approaches to learning: a school work module (SWM) and an intentional learning module (ILM). Iran-Nejad (1989; 1990; 1992; 1993; 1994) proposed a third interest-creating discovery module (ICDM) from

the viewpoint that learning is the reorganization of one's own knowledge. SWM perpective of learning implies that learning is direct internalization of external knowledge, and ILM module suggests that learning is the constructive internalization of external knowledge. Appendix A presents a comparison and contrast of the three approaches. One important aspect of these modules to this study pertains to the key concept associated with each; namely, wholetheme learning and teaching (ICDM), piecemeal, rote learning (SWM), and intentional, effortful learning (ILM).

Haygood & Iran-Nejad (1993) investigated whether Bereiter's two modules are by themselves an adequate description of students' learning conceptions, or whether there is a third conception that, when combined with Bereiter's SWM and ILM, is a more comprehensive treatment of students' conceptions. A Learning Conceptions Inventory was designed for an empirical study of students' conceptions, and a factor analysis was conducted on the first pilot study of the LCI. A scree plot of Eignevalues revealed that three factors showed significant separation from other Eignevalues; hence, a discrete three-factor solution was produced yielding three significant and interpretable factors.

In regard to the key concepts of these contextual modules, both SWM and ILM would be theoretically orthogonal if not juxtaposed to ICDM; in particular, ICDM concept emphasizes a wholetheme approach, while SWM and ILM would probably fit into a piecemeal, incremental approach to learning. That is not to say that ILM and SWM are exactly the same; however, the juxtaposition does imply that when ICDM is introduced that ILM/SWM might begin to lose their distinctiveness in some ways. Wholetheme approach to teaching and learning emphasizes simplication by integration rather than simplification by isolation (Iran-Nejad, 1994), is multisource (Iran-Nejad, 1990), and includes intuition (Iran-Nejad, 1993), and intentional as well as incidental learning experiences (Iran-Nejad, Marsh, & Clements, 1992). Themes that

are closely associated with wholetheme approach include the contextuality of learning and learning approaches as contextual modules (Bereiter, 1990), and sources of self-regulation, or, Who is in control--if anyone, of learning?

Styles of Learning

Personality type/learning style-research has been popular for several decades, and, according to Myers & McCaulley (1985), possesses strong appeal for students and educators, as well as counselors. One of the most popular instruments over the past decade has been the Myers-Briggs Type Indicator (MBTI). The MBTI is based on Jung's theory of personality type, which focuses on the idea of opposite sets of characteristics in human personality (McCaulley, 1990; Lawrence, 1982). Myers and Briggs adapted Jung's theory and created an instrument that consists of four scales representing four pairs of preferences: extraversion (E) vis-a-vis introversion (I), sensing (S) vis-a-vis intuition (N), thinking (T) vis-a-vis feeling (F), and judging (J) vis-a-vis perceiving (P). Therefore, an individual's personality type will consist of four descriptors (letters), one from each pair of preferences.

According to Myers & McCaulley (1985), academic aptitude is particularly related to EI and SN dimensions, decision-making to JP, and interest to SN and EI. Some implications of MBTI scales for learning (style) are:

1. Introverts will do better than extraverts in academia since schoolwork requires working intensively with concepts and ideas;

2. Intuitives will do better than sensing types since an academic context requires the capacity to work with abstraction, symbols, and theory;

3. Hence, IN-students will have a relative advantage over students who are ES (Myers & McCaulley, 1985);

4. Academic tasks requiring logical analysis favor thinking (T) types,

while tasks requiring understanding human motivations favor feeling (F) types;

5. The judging (J)-perceiving (P) preference relates to problem-solving and decision-making in that J's tend to move toward closure quickly, while P's tend toward leaving one's options open. For a further description of MBTI types and their relationship to learning styles see Appendix B.

According to type theory, learners learn best through instruction that approximates their preferred personality attitudes and functions. The implications of learning conceptions and learning styles for educational settings is straightforward. However, one additional comparison between conceptions and styles is that while styles are generally considered relatively stable, learning conceptions may theoretically change.

RATIONALE & PURPOSE FOR THIS STUDY

Haygood & Iran-Nejad (1993) reported that one of the goals of their earlier study was to investigate the relationship between learning conceptions based on three modules and personality types/learning styles of college students. This present study purports to do just that. Specifically, the researchers compared learning conceptions as described by the Learning Conceptions Inventory (LCI) with learning styles/ personality types of the Myers-Briggs Type Inventory. Our interest, therefore, was:

1. To explore the relationship between learning conceptions and learning styles; and

2. To investigate how learning conceptions and learning styles relate to academic learning as measured by students' GPA.

The importance of this study could possibly result in a more optimistic prediction of the 40% of entering college students who never graduate.

METHOD

Subjects

The subjects were 303 volunteer graduate and undergraduate students from The University of Alabama, Tuscaloosa, Alabama, Beeson Divinity School of Samford University, Birmingham, Alabama, Birmingham Theological Seminary, Birmingham, Alabama, and the School of Education of Samford University, Birmingham, Alabama. Table 1 shows the distribution of the student population according to institution and particular course the student was taking.

Insert Table 1 about here

The subjects were asked to complete both instruments in a classroom setting. When the statistical analysis was run on SAS at The University of Alabama, it was discovered that from one (1) to four (4) missing values were observed on the LCI report forms: SAS automatically removes these entire samples; hence, the LCI reported a different number of observations than the MBTI reported.

The inclusion of graduate students in this study is not an essential element for the present research, but serves only to increase the number of participants. A comparison between the undergraduate and graduate population will be studied at a later time. The purpose of including populations from three institutions (The University of Alabama, Beeson Divinity School, and Samford University) is not to compare respective institutions but only to enhance the research by involving more students from several institutions and from a variety of courses. It is believed that such inclusions will improve generalizability.

Instrumentation

Two instruments were used to examine the relationship between learning conceptions and learning styles: (a) the Learning Conceptions Inventory (LCI), and (b) the Myers-Briggs Type Indicator (MBTI); the results were compared with students' GPAs.

Learning Conceptions Inventory

A Learning Conceptions Inventory (LCI) was designed by the researchers (Haygood & Iran-Nejad, 1993) to measure the conceptions of learning corresponding to three modules: (a) learning as straight internalization of external knowledge (Bereiter's SWM); (b) constructive internalization of external knowledge (Bereiter's ILM); and (c) the reorganization of one's own knowledge (ICLM).

The LCI is an 85-item, 27-category (3 items in each category, plus four test items) instrument designed to describe how students approach learning. Categories include such topics as affect (anxiety), purpose in study, writing term papers, memory, teacher expectations, outcome, metacognitive awareness, and locus of control. The items are randomly assigned throughout the instrument so that items within the same category do not appear in close proximity to one another. (Appendix C contains items from the LCI.)

Reliability. An earlier pilot study was conducted with 44 volunteer BEP205 students in December, 1993, at The University of Alabama. Cronbach coefficient alpha yielded a reliability of .94 with item-to-total coefficients ranging from -0.17 to .87. Such a large coefficient indicates the strong internal consistency of the instrument. The standard error of measurement for the LCI was 1.004.

Validity. According to Pittenger (1993), validity is a unitary concept requiring that validity be established from many sources of corroboration; hence, validation of the LCI is a process that has not reached finality. Content validity

continues to occupy the researchers evaluation, and revisions of items are planned in the future. Criterion validity has not yet been established, but the instrument's correlation with GPA and other variables will continue to be explored; hence, the criterion might become academic success (as measured by GPA). Predictive validity will continue to be tested with GPA correlations with new subjects, and through a longitudinal study with previous subjects.

Myers-Briggs Type Inventory

The Myers-Briggs Type Inventory (MBTI) was used in order to describe students' learning styles. The learning style component of the MBTI is primarily NS preference; however, other relevant descriptors of learning style in the MBTI will also be used. The MBTI (Form G) is a 126-item instrument that purports to report individual personality type, and is, it claims, based on Jung's theory of personality types (McCaulley, 1990). Form F (cf. Carey, Fleming & Roberts, 1989) and Form G (Williams & Price, 1993) are both used for research purposes; however, Form F is generally considered obsolete. Form F is longer (166 questions), although the correlations of item weights for Form F and Form G are essentially interchangeable. According to the MBTI, there are four categories of personality descriptors, each category contains opposite functions. Hence, there are 16 possible personality types.

Scores from the MBTI are reported on four dichotomies: EI, SN, TF, and JP. While the scores are reported on a continuous scale, every score is translated into a nominal choice. The unfortunate aspect of this method is that a person who scores only plus-one on any scale is typed as that particular letter. Pittenger (1993) severely criticized the MBTI on this very point. However, the MBTI interpretative material warns against typing a person as clearly one particular type if that person's choice score is less than ten. The MBTI is not recommended for individuals

less than the eighth grade. (A companion instrument has been recently developed for measuring the type of children; namely, the Murphy-Meisgeier Type Indicator for Children (MMTIC) (Meisgeier & Murphy, 1987).

The purposes for utilizing the MBTI in this study is that (a) the learning style components are associated with personality types, and (b) the MBTI enjoys wide popularity in educational (and other) contexts (cf. Myers & McCaulley, 1985). Examples of the learning styles/personality types that are depicted by the MBTI are described by various researchers and educators; for example, Myers & McCaulley (1985), Lawrence (1982), Oxford (1990), Ehrman & Oxford (1990), Provost (1990), and Myers & Myers (1980), et al [vide: Appendix B].

Reliability. Although reliability studies of the MBTI have not been extensive, there is a growing body of literature on the psychometric properties of the MBTI (cf. Williams & Price, 1993). Carlson (1985) reported that available studies indicate satisfactory internal consistency on each of the four scales. Myers & McCaulley (1985) concluded that test-retest reliabilities show consistency over time, a conclusion that Strickler & Ross (1964) had reported earlier (cf. Carskadon, 1977). Johnson (1992) also reported evidence for the stability of the MBTI scores over a 30-month period ranging from .79 to .83; however, the reliability of the TF-scale was less stable (r= .62) (cf. Williams & Price, 1993). Carlyn (1977) reported split-half reliability from .66 to .92, and that, generally, reliability seemed to be satisfactory.

Contrary to the positive interpretation of the MBTI in the previous paragraph, Pittenger (1993) blisters the MBTI as a personality descriptive instrument as well as the interpretation of the psychometric reliability and validity that researchers have reported. Pittenger (1993, p. 483) concludes: "Taken as a whole, the MBTI makes few unique practical or theoretical contributions to the understanding of

behavior." While Pittenger's criticisms should not be ignored, further research can only enhance the interests of the educational and professional communities.

Validity. Validity seeks to determine whether an assessment instrument measures what it purports to measure. Myers & McCaulley (1985) stated that the validity of the MBTI is determined by its ability to show relationships and outcomes predicted by Jung's theory. Hence, construct validity may be ascertained by comparing the observable behaviors of those subjects in a type-grouping with the behavior described by theory for that type, a relationship that Myers & McCaulley (1985) seemed to demonstrate. Criterion-related validity also seems to have been evidenced in that behaviors predicted regarding type-description appear consistent with that prediction. Furthermore, due to the long history of the development of the MBTI, the revision of items, the different forms in which the instrument appears, and empirical evidence, face and content validity seem to be established in that the instrument seems to measure the kinds of things about which appropriate conclusions may be drawn (cf. Myers & McCaulley, 1985). In studies of 37 instruments and samples, Myers & McCaulley (1985) reported correlations of MBTI continuous scores with other scales; therefore, the MBTI appears also to have convergent validity. Carey, Fleming & Roberts (1989) pointed out that the MBTI scales correlate with other instruments in a manner consistent with type theory. Fourqurean, Meisgeier & Swank (1990) also reported correlations of the MBTI and the 16 Personality Factors Questionnaire. Furthermore, Myers & McCaulley (1985) argued that correlations have limitations as evidence for construct validity in that they report only the four preferences sequentially, but do not show the 16 types as dynamic entities.

Thompson & Borrello (1986) provided strong empirical support for the MBTI four theoretical dimensions based on factors. Tzeng, Outcalt, Boyer, Ware & Landis

(1984) conducted four thorough psychometric analyses of the MBTI items, and reported that the four factors yielded an almost perfect match with the four theoretical construct-scales.

RESULTS

Two research methods were used in order to analyze the data: canonical correlational analysis, and regression analysis.

Canonical Correlational Analysis. In order to investigate the different dynamics "that are involved in the ability of one variable set to explain in different ways different portions of the other variable set" (Thompson, 1984, p. 59), a canonical correlation was conducted on the three-factor model with special attention toward structure coefficients. Tables 2, 3, and 4 show the relationship between the (synthetic) canonical variables and the squared canoncial correlation (r^2_c). Based on the squared canonical correlation (i.e., the amount of variance in the MBTI accounted for by the LCI), only factor #1 (ICDM, r^2_c= .24) and factor #2 (SWM, r^2_c= .09) showed significance at Pr < .01; therefore, 33% of the variance was accounted for. Since variable #3 was non-significant (Table 4), it will not be included in this analysis.

Insert Tables 2, 3, & 4

About Here

Table 2 shows that that portion of the LCI that is contributing to variable #1 is SWM (-.89), some of ICDM (.39), and that the MBTI scales that are contributing to variable #1 are SN (.85) and JP (.66). Therefore, SWM and SN are strongly negatively correlated, which is what one would expect because SWM focuses on

memorizing, while the SN scale depicts the MBTI learning approach, i.e., S (sensing) as responding to learning situation with sensory aspects, and N (intuitive) as responding to learning situations creatively, imaginatively, etc. SWM is also negatively related to the JP scale (.66), which is also not surprising in that the P (perception) scale reflects a desire for flexibility, surprises, and spontaneity. Note also that ICDM is contributing some to r^2_c= .25 and therefore is moderately positively related to SN and JP. This positive relationship between ICDM and N (intuition) and the negative relationship between SWM and N is an important observation that supports the theoretical suspicion of the researchers.

Table 3 shows that variable #2 has a r^2_c= .09; admittedly, this is not strong, but some of the variance in the MBTI is being accounted for by the LCI here. In particular, IIM (.72) and JP (.66) are contributing the most. However, ICDM (-.69) combines with IIM, and EI (.40) combines with JP. The implication is that IIM is more strongly related to the JP scale, which is what one would expect in that IIM (intentional learning) focuses on structure, planning, quizzes, which is also the preferred style of J (judging)-types. Note particularly that ICDM is contributing negatively compared with the other variables that show some contribution: This observation also suggests the distinction between IIM, on the one hand, and JP (particularly J), on the other hand. The pattern that emerges here between the LCI and the MBTI variables seems to support the anticipated dynamics of the relationship of the two instruments; namely, when IIM is positively related to JP combined with EI, then ICDM will be negatively related to those same scales.

A summary of the results of the canonical correlational analysis points to the following results:

1. Only two variables showed significant r^2_c of the relationship between the MBTI by LCI;

2. When significance was demonstrated, ICDM showed a negative relationship with SWM and IIM;

3. When significance was demonstrated, ICDM contributed positively to r^2_c (where IIM did not contribute) along with SN and JP scales of the MBTI; whereas, ICDM contributed negatively to r^2_c (where IIM contributed positively) along with JP and EI scales of the MBTI;

4. Therefore, interest-and-discovery-learning-conception (ICDM) seems to be related to sensing/intuition and to judging/perception learning styles where an intentional learning conception (IIM) and a rote memorization learning conception (SWM) are not contributing significantly.

Regression Analysis. In order to address the second purpose of this study, viz., How do students' learning conceptions and learning styles relate to academic learning as measured by students' GPA?), regression analyses were conducted to evaluate possible linear relationships. Table 5 shows the results of the various regression analyses relative to the research question. (Note that the number of observations varied due to missing observations in the LCI.)

Insert Table 5 about here

Regarding analysis number #1 (LCI) (mean= 3.05, standard deviation= .61), the Pearson correlation coefficients showed no multicolinearity. Coefficient for each factor was as follows: ICDM .16, SWM -.00, IIM -.31. In evaluating the most parsimonious model, none of the models were particularly strong, but a two-factor model seemed to be the best; namely, ICDM (.09) and IIM (-.19) with R^2= .12, GPA =

3.08. Both SVM and ILM contributed negatively in all the models; however, not significantly.

Regarding analysis number #2 (MBTI), mean= 3.05. Tukey's Studentized Range (HSD) was conducted which did not demonstrate significance (a = .05). However, in an empirical examination, MBTI type comparison showed significance between ISTP and INTJ (lower limit= -2.50, upper limit= .16, mean difference= -1.17. This would seem to indicate that the MBTI scale, ISTP-INTJ, is contributing most the GPA.

Regarding analysis number #3 (Gender/Race), significance was established with F= 6.27, Pr> .0004. However, Sum of Squares significance test demonstrated that only race was significant, F= 8.80, Pr> .0002; hence, it was concluded that race was contributing significantly to GPA, and that gender was not. Tukey's Studentized Range (HSD) Test also showed significance for race, in particular, between Euro-American and Afro-American. No significance was demonstrated either between Euro-American vis-a-vis Asian, nor Afro-American vis-a-vis Asian. However, the number of Euro-Americans (285) far outnumbered Afro-Americans (33) and Asians (3). In subsequent studies that do not show a large sample for discrete groups, those groups will be collapsed into one, i.e., "Other Origins."

Regarding analysis number #4 (LCI/MBTI-together), significance was established at F= 3.0, Pr> .0001, GPA mean= 3.08, with 19% of the variance accounted for by both instruments. However, Sum of Squares test of individual variables for significance demonstrated that only two factors from the LCI were significant, ICDM (.05) and ILM (.0001). An empirical examination of Tukey test showed significance, similar to analysis number #2 (MBTI alone), in comparison between INTJ and INTP (lower= -.70, upper= 3.0, mean difference= 1.13). This would seem to indicate that the MBTI scale, INTJ-INTP, is contributing most to GPA.

Regarding analysis number #5 (LCI/MBTI/Gender/Race-together), significance was

established at F= 3.58, Pr> .0001, GPA mean= 3.09, with 25% of the variance accounted for by all the variables. However, Sum of Squares test of individual variables for significance showed that, similar to the separate studies above, four variables were contributing significantly; namely, MBTI (Pr> .01), Race (Pr> .0005, Factor 1/ICDM (Pr> .01), and Factor 3/ILM (Pr> .0001). As in analysis number #4, INTJ-INTP scale was contributing significantly (lower limit= -.65, upper limit= 2.91, mean difference= 1.13.

A summary of the regression analyses point to the following results:

1. Variables considered by themselves (e.g., LCI, MBTI, or Gender/Race) did not account for a high degree of the variance, i.e., each was less than .20; however, LCI did account for the most variance.

2. When significant variables were combined with other significant variables (e.g., LCI with MBTI), there was an increased amount of the variance accounted for; hence, some practical significance is indicated for such combinations. That is to say, if educators and students were aware of both learning conceptions and learning styles of students, then the potential for enhancing students' academic experience is increased;

3. All variables under consideration combined to produce a reasonably moderate R^2 at .25; hence, some practical significance of identifying students' learning conceptions and learning styles; however, since the race-variable was somewhat small for African-Americans, no practical conclusion should be drawn from the data at this point;

4. The LCI's best model for predicting GPA was a two-fold model, ICDM + ILM--although ILM was contributing negatively to this model; hence, an ICDM learning conception seems more promising as a positive contributor to GPA. SWM showed no significant contribution, hence, it may be too strong to conclude that SWM is

actually working contrary to academic performance, nevertheless, SWM does not show positive contributions in any of the models.

DISCUSSION AND CONCLUSIONS

The present study had two primary purposes: (1) To explore the relationship between learning conceptions and learning styles; and (2) to investigate how learning styles and learning conceptions related to academic learning as measured by students' grade point average (GPA). The researchers feel that they some important observations may be made based on the results of this study.

With regard to the foregoing research purposes, the following conclusions are indicated:

SWM and ILM learning conceptions seem to be negatively related to ICDM. The implication is that, in a three-factor model, SWM and ILM are distinct from ICDM, and that, if Iran-Nejad's bipartite description of learning conceptions (viz., wholetheme vis-a-vis piecemeal approaches) is correct, SWM and ILM may be described as piecemeal. With regard to the MBTI types, ILM seems to correspond to characteristics associated with sensing (S) types--particularly when S is positively combined with the JP (judging-perception)-scale. SWM is also associated with S types, and such a combination may actual inhibit learning in academic (college) contexts.

ICDM corresponds to characteristics associated with N's, with a preponderance of INTP's and INTJ's. It will be remembered that ICDM's key concept is wholetheme learning in contrast to mere intentional learning (ILM) or rote learning (SWM). Therefore, the wholetheme ICDM-module seems to be a promising contributor for enhancing students' academic success. Wholetheme learning bears some resemblance to INTJ-INTP learning styles, and these learning styles are those that have been predictably more successful in academic contexts (Myers & McCaulley, 1985).

Therefore, INTJ-INTP students seem to approach learning with characteristics associated with a wholetheme (ICDM) learning conception.

These results seem to indicate that an ICDM learning conception is the best predictor of academic success, and when ICDM is combined with INTJ-INTP scale, academic achievement is significantly enhanced. The conclusions that the researchers have tentatively reached, therefore, is that teaching and learning that is wholetheme correlates with INTJ-INTP scale of the MBTI, and that success is predictable. The researchers would further conclude that S types (especially ES; cf. Myers & McCaulley, 1985) are seriously disadvantaged in traditional academic contexts. The problem is, according to Jung's (1926) type theory, persons are imprisoned in their types. However, according to type theory, since every person possesses all the preferences of MBTI-type categories, it would seem possible, regardless of type, to help students develop a learning conception, in particular--ICDM, that would enhance their academic experience. It is therefore hoped that this study will address the problem of college drop-outs, and other students' who struggle with learning in academic contexts.

FUTURE STUDY

This has been an illuminating and exciting study for the authors. Yet, further research is anticipated as we plan to revise the LCI, conduct further similar studies along with longitudinal studies, and we would like to conduct this study in authentic real-world context. We further anticipate exploring the relationship between SWM, ILM, and ICDM with Saljo's (1979) and Beaty, Dall'Alba, and Marton's (1990) learning conceptions.

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Table 1
Distribution of Sample Selection

School and Course	Subjects
The University of Alabama	
BEP 205 (Educational Psychology)	170
BER 450 (Tests & Measurements)	74
BER 558 (Psychometrics)	12
Subtotal	**256**
Beeson Divinity School (Samford)	
DVOT511 (Hebrew)	23
Birmingham Theological Seminary	
BC7501 (Biblical Counseling)	16
Samford University	
School of Education	8
Total	**303**

Table 2
Canonical Structure for Variable 1

LCI Factors	Squared Canonical Correlation	MBTI Scales
		M_1= -0.23
F_1= .39		M_2= .85
F_2= -0.89	r^2_c= .24	M_3= -0.22
F_3= .25		M_4= .66

Table 3
Canonical Structure for Variable 2

		M_1= .40
F_1= -0.69		M_2= -0.22
F_2= -0.10	r^2_c= .09	M_3= .09
F_3= .72		M_4= .66

Table 4
Canonical Structure for Variable 3

		M_1= -0.48
F_1= .61		M_2= .37
F_2= .44	r^2_c= .00	M_3= .88
F_3= .65		M_4= .34

Table 5
Summary of Regression Analyses

Regression Analyses	Variance Accounted for	Subjects
(1) LCI	.12	250
(2) MBTI	.10	290
(3) Gender/Race	.06	285
(4) LCI/MBTI	.19	250
(5) LCI/MBTI/ Gender/Race	.25	247

Appendix A
ANALYSIS OF LEARNING CONCEPTIONS BASED ON THREE MODULES

SWM	ILM	ICDM
-Adapting to a job -focus: task performance -incremental; rote -concept of lrng: straight internalization of external knowledge	-responding intentionally to difficult learning situations as problems to be solved... -concept of lrng: constructive internalization of external knowledge -involves self-conscious, learning-conscious approach	-wholetheme -authentic versus academic context -multisource -insight,discovery incidental -concept of learning: reorganization of one's own internal knowledge

Brief Description of Personality Types According to the MBTI

ISTJ
thorough, orderly, logical, loyal, task-committed, practical

ISFJ
conscientious, thorough, patient with routine & detail

ISTP
curious, interest in cause & effect, efficient use of time & energy

ISFP
sensitive, modest, harmonious, follower, existential, relaxed regarding obligations

ESTP
unhurried, flexible, hands-on oriented, may by insensitive to others

ESFP
relaxed, existential, aware of present, fact-oriented, good common sense

ESTJ
realistic, practical, selective about effort, leaders

ESFJ
cooperators, popular, warm, sensitive, non-abstract, people-oriented

INFJ
originality, conscientious, serve social good, persevering, prinicpled

INTJ
originality, independent, skeptical, critical, organized, goal-oriented

INFP
loyal, enthusiastic, love learning, over-committed, absorbed in personal projects

INTP
logical, theory-oriented, performs well on exams, likes to focus on big issues

ENFP
imaginative, enthusiastic, people- & solution-oriented, spontaneous

ENTP
ingenious, stimulating, broad interests, outspoken, resourceful

ENFJ
responsible, sensitive to others, socially active, leader of people groups/discussions

ENTJ
leader, frank, cogent speaker, well-informed, self-confident

Characteristics Associated with MBTI Type Dimensions

EXTRAVERSION (E)
oriented toward outer world of actions, objects & persons; uses trial & error; looks for stimulation; outspoken; might tend toward intellectual superficiality

INTROVERSION (I)
oriented toward inner world of ideas & concepts; reflective; looks inward for stimulation & energy; subtle; often im-impenetrable

SENSING (S)
perceives with senses--hence, focused on immediate, real, practical; likes facts--dislikes abstract; likes rules, objective tests; cautious with detail

INTUITION (N)
perceives possibilities; likes abstract, ideas; looks for pattern(s) & big picture imaginative & often creative

THINKING (T)
makes decisions objectively, logically; looks for cause & effect; skeptical; firm-minded

FEELING (F)
makes decisions subjectively, based on values & human concerns; tactful; not brief or businesslike; harmony-oriented

JUDGING (J)
likes to live by plan & order; wants to control events; likes closure

PERCEIVING (P)
likes to live spontaneously with flexi-bility; adaptable; resist closure

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Characteristics Associated With Each Type
Relative to Learning[1]

EXTRAVERSION
discuss ideas in class, ask questions; group projects; class activities; field work; discuss rather than write; move quickly through material going for breadth, rather than depth

INTROVERSION
reflect on ideas, listening more than talking; individual projects; learn by inward reflection, reading, & writing; understand a few things in depth rather than skim a wide-range of material

SENSING
learn facts; memorizing; sequenced material; specifics to theory; concrete; actual results; useful & practical; specific, exact directions and assignments from teachers

INTUITIVE
learn new ideas; get general picture or theory; skip around, follow hunches;work with complex problems & symbols; original & creative approaches; freedom to pursue assignments in unique way

THINKING
use logic & cause-and-effect thinking; study & writing about impersonal material (technical, factual, scientific); grading system that is fair & impartial; teachers who have expertise; being shown why; being able to critique & debate ideas

FEELING
use personal values & reactions to evaluate material; content must be mean-ingful; personal approach; people-issues; knowing the teacher cares about them; a classroom with a feeling of belonging and friendliness

JUDGING
structure & well-defined assignments; quizzes to measure progress; time to plan, & no surprises; closure; teachers stick to schedule & subject

PERCEIVING
flexibility in classroom; some surprises; spontaneity; freedom in classroom and assignments; start projects under dead-line; several project at same time

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